

ICC-ES Evaluation Report


ESR-5478

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<p>DIVISION: 07 00 00— Thermal and Moisture Protection</p> <p>Section: 07 42 13—Metal Wall Panels</p>	<p>REPORT HOLDER: SY CO., LTD.</p>	<p>EVALUATION SUBJECT: PIR SANDWICH PANEL</p>	
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1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2024, 2021 and 2018 [International Building Code® \(IBC\)](#)

Property evaluated:

- Structural
- Thermal Barrier
- Surface Burning Characteristics (core material only)

2.0 USES

The PIR Sandwich Panels described in this report are insulated panels used as exterior nonload-bearing wall panels and interior partition wall and ceiling panels in any type of construction. When installed in Types I, II, III or IV construction, the exterior wall panels must comply with Section 4.4 of this report.

3.0 DESCRIPTION

3.1 General:

The PIR Sandwich Panels are factory-assembled, metal-faced, sandwich panels with a chemically bonded, continuously foamed-in-place foam plastic core. The panels are available in thickness 1.97 inches through 3.94 inches (50 to 100 mm), width of 39.4 inches (1000 mm) and lengths up to 44.1 feet (13,450 mm). See [Table 1](#) for panel types.

3.2 Materials:

3.2.1 Panel Core: The core of the panels is a polyurethane foam plastic as specified in the approved quality documentation. The cores have a 2.80 pcf (45 kg/m³) nominal density, and have a flame-spread index of 25 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84. The foam plastic is continuously foamed-in-place into the core of the panel during panel fabrication.

3.2.2 Panel Facers: Panel facers are composed of hot-dipped galvanized or aluminum-zinc alloyed steel sheet with silicone-modified polyester (SMP) or polyvinylidene fluoride (PVDF) coating. The facers come in different thickness varying from 0.020-inch (0.5 mm) through 0.033-inch (0.85 mm) as shown in [Table 1](#) of this report. Panel facing material is steel conforming to ASTM A653 CS (Commercial Steel) Type A with Z275 coating designation or ASTM A792 with AZ90 coating designation and having a minimum yield strength of 43.5 ksi (300 MPa) and minimum tensile strength of 56.6 ksi (390 MPa).

3.2.3 Connections:

3.2.3.1 STS Clips: The STS clips are brackets that are used to fasten the wall panels to supporting framing. The STS Clips are made from stainless steel, and are 1¹/₁₆-inch (18 mm) wide by 1¹⁵/₁₆ inches (50 mm) long by 0.079-inch (2 mm) thick. See [Figure 14](#) for details of the STS clip.

3.2.3.2 STS Clip Fasteners: Screws used to attach the panels to steel supports must be, as a minimum, No. 14, self-drilling or self-tapping screws. The screws used with the panels must be sufficiently long to penetrate through the structural supporting member. The fastener connection to the supporting member must be designed to the satisfaction of the code official. The fasteners must be corrosion-resistant. See [Figure 14](#) for detail of STS clip.

3.2.4 Sealant: Silicone sealant must comply with ASTM C920 or equivalent local standard and must be applied in accordance with the report holder installation instructions and recommended applications of the sealant manufacturer.

3.2.5 Flashing and Trim: Flashing and trim material must be corrosion-resistant steel complying with the applicable code and match material, thickness, and finish of metal panel facers.

4.0 DESIGN AND INSTALLATION

4.1 Design:

An analysis must be submitted to the code official showing that the panel system, including fasteners and structural framing members, provides a complete load path capable of transferring all loads and forces from their point of origin to load-resisting elements. [Tables 2, 3](#) and [4](#) of this report contain allowable out-of-plane transverse uniform wind loads for the exterior wall cladding panels. [Table 5](#) of this report lists allowable spans for interior partition wall panels specified in 2024 and 2021 IBC Section 1607.16 (2018 IBC Section 1607.15).

4.2 Installation:

4.2.1 Exterior Wall Cladding:

Each wall panel must be placed with the panel's longitudinal edge oriented in the vertical or horizontal orientation. Individual panels may span one, two, three or more spans. The panels must be fastened to structural steel supports by means of STS clips and STS clip fasteners placed in the tongue-and-groove longitudinal joint of the panels. The structural support members must provide a minimum bearing width of 2.5 inches (64 mm) to the panels.

A minimum of two STS clip fasteners must be used at each STS clip location. The capacity of the STS clip fasteners to supporting steel member must be designed by registered design professional.

Sealant must be field-applied during panel installation in accordance with approved construction documents. See [Figures 1-9](#) for typical panel joint details.

Provided the sealants and application of the sealants are satisfactory to the code official, panels exposed to weather do not require a weather-resistive barrier in accordance with Section 1405 of the IBC, when panels are installed with sealant as specified in this section (Section 4.2) and wall openings and penetrations are flashed. Flashing must be placed in accordance with IBC Section 1404.4 on both ends of the panels when installation is at the building's base, and at eaves, openings, and horizontal and vertical corners. The flashing is attached to the panels with self-tapping, self-drilling screws or pop rivets in accordance with the approved construction documents.

4.2.2 Interior Wall Partition and Ceiling Panels:

Each wall panel must be placed with the panel's longitudinal edge oriented vertically. The top and bottom of the panel must be connected to the supporting structure using steel channels or aluminum molding and fasteners. The steel channels and aluminum molding and fastener capacity must be designed by a registered design professional. See [Figure 12](#) for typical installation detail of interior partition wall panel.

4.2.3 Ceiling Panels:

Installation of ceiling panels must be in accordance with manufacturer's installation instructions and as determined by registered design professional. Ceiling panel support system must be designed by a registered design professional. See [Figure 13](#) for typical installation detail of ceiling panel. The maximum unsupported ceiling panel span must not exceed 138 inches (3.5 m).

4.3 Thermal Barrier:

An approved thermal barrier complying with IBC Section 2603.4 is not required, based on testing in accordance with FM 4880, as indicated in IBC Section 2603.9.

4.4 Types I, II, III or IV Construction:

Exterior wall panels in buildings classified as Types I, II, III or IV construction must comply with IBC Section 2603.4.1.4.

5.0 CONDITIONS OF USE:

The PIR Sandwich Panels described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 Panels must be installed in accordance with this report and the manufacturer's published installation instructions, a copy of which must be available at the jobsite. In the event of a conflict between this report and the manufacturer's published installation instructions, the more restrictive governs.
- 5.2 Exterior and interior wall panels must be limited to non-load bearing wall applications.
- 5.3 The ceiling panels are limited to ceilings not considered accessible in accordance with Item 30 of 2024 IBC Table 1607.1 (Item 29 of 2021 IBC Table 1607.1 or Item 28 of 2018 IBC Table 1607.1), as applicable.
- 5.4 Remaining portions of the structure, other than panels, must be designed and constructed in accordance with the code.
- 5.5 Construction plans, calculations for actual loading conditions and calculations for the connection of the panel to the supporting member must be submitted to the code official for approval.
- 5.6 All construction documents specifying the panels described in this report must comply with the design limitations of this report. Drawings and design details demonstrating that the panels comply with this report must be submitted to the code official at the time of permit application. The drawings and design details must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
- 5.7 The panels described in this report have been justified for installation without the thermal barrier in accordance with Section 4.3 of this report.
- 5.8 Installation of panels in Types I, II, III or IV construction must comply with Section 4.4 of this report.
- 5.9 Interior finish classification of the PIR Sandwich Panels is outside scope of this report and compliance must be demonstrated to the satisfaction of code official.
- 5.10 The PIR Sandwich Panels are manufactured under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with the [ICC-ES Acceptance Criteria for Sandwich Panels \(AC04\)](#), dated February 2012 (editorially revised July 2024), including report of testing in accordance with ASTM E84 (core material only), ASTM E330 and FM 4880.

7.0 IDENTIFICATION

- 7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-5478) along with the name, registered trademark, or registered logo of the report holder must be included in the product label.
- 7.2 In addition, the PIR Sandwich Panels are identified by the report holder name (SY Co., Ltd.) and address and panel type.
- 7.3 The report holder's contact information is the following:

SY CO., LTD.
SY BUILDING, 340-2, JEONGJO-RO, GWONSEON-GU, SUWON-SI
GYEONGGI-DO, 16666
SOUTH KOREA
82 70 4808 3896
www.sypanel.com
yskim019@daum.net

TABLE 1—PANEL TYPES

Panel Type	Exterior Facer Thickness (mm)	Interior Facer Thickness (mm)	Core Thickness Insulation (mm)	Panel Type Profile	Application
NNU-3BT	0.5 through 0.85	0.5 through 0.85	50, 75, 85 or 100	Figure 1	External Wall Cladding
WNU-3BT				Figure 2	
FNU-500BT				Figure 3	
WNU-500BT				Figure 4	
FNU-1000BT				Figure 5	
WNU-1000BT				Figure 6	
FNU-BS ¹				Figure 7	
WNU-BS				Figure 8	
U-METAL				Figure 9	
FFU	0.5 through 0.8	0.5 through 0.8	50, 75 or 100	Figure 10	Internal Wall Partitions and Ceiling
NNU				Figure 11	

For Imperial Units: 1 mm= 0.0394 inch; 1 m= 3.05 feet; 1 kgf/m2= 0.205 psf

¹ FNU-BS may also be used in interior wall partitions and ceiling applications.

Table 2-Allowable Positive and Negative Uniform Load for 50mm Thick Exterior Wall Panels (kgf/m2)

Panel Skin Thickness (mm)		Number of Span	Load Type	Panel Support Spacing (m)						
Facer	Liner			1	1.5	2	2.5	3	3.5	4
0.5	0.5	1	Wind	341.4	197.0	124.0	82.2	56.7	40.3	29.6
		2	Wind	350.0	212.8	144.4	104.6	78.1	60.2	47.0
		3	Wind	353.1	214.8	144.9	103.1	75.5	56.7	43.4

Panel Skin Thickness (mm)		Number of Span	Load Type	Panel Support Spacing (m)						
Facer	Liner			1	1.5	2	2.5	3	3.5	4
0.6	0.5	1	Wind	344.4	200.5	127.6	85.7	59.7	42.9	31.7
		2	Wind	351.6	214.8	147.0	106.7	80.1	61.8	48.5
		3	Wind	354.6	217.4	147.5	105.6	78.1	58.7	45.4

Panel Skin Thickness (mm)		Number of Span	Load Type	Panel Support Spacing (m)						
Facer	Liner			1	1.5	2	2.5	3	3.5	4
0.6	0.6	1	Wind	347.5	204.1	131.7	88.8	62.3	44.9	33.7
		2	Wind	353.6	217.4	149.0	108.7	82.2	63.8	50.5
		3	Wind	356.1	219.4	150.0	108.2	80.6	61.2	47.5

Panel Skin Thickness (mm)		Number of Span	Load Type	Panel Support Spacing (m)						
Facer	Liner			1	1.5	2	2.5	3	3.5	4
0.7	0.5	1	Wind	346.5	203.1	130.1	87.8	61.8	44.4	32.7
		2	Wind	353.1	216.4	148.5	108.2	81.7	63.3	50.0
		3	Wind	355.6	218.9	149.0	107.2	79.6	60.7	47.0

Panel Skin Thickness (mm)		Number of Span	Load Type	Panel Support Spacing (m)						
Facer	Liner			1	1.5	2	2.5	3	3.5	4
0.8	0.5	1	Wind	347.5	205.1	132.2	89.8	63.3	45.9	34.2
		2	Wind	353.6	217.4	149.5	109.2	82.7	64.3	51.0
		3	Wind	356.1	219.9	150.5	108.7	81.1	61.8	48.0

For Imperial Units: 1 mm= 0.0394 inch; 1 m= 3.05 feet; 1 kgf/m2= 0.205 psf

Table 3-Allowable Positive and Negative Uniform Load for 75mm Thick Exterior Wall Panels (kgf/m²)

Panel Skin Thickness (mm)		Number of Span	Load Type	Panel Support Spacing (m)						
Facer	Liner			1	1.5	2	2.5	3	3.5	4
0.5	0.5	1	Wind	541.4	325.5	214.3	148.5	106.1	78.1	58.7
		2	Wind	548.0	340.3	236.2	174.0	133.7	105.1	84.2
		3	Wind	551.0	343.9	238.3	174.5	131.7	102.1	80.1
0.6	0.5	1	Wind	544.4	329.6	219.4	153.1	110.2	81.7	61.8
		2	Wind	550.5	342.9	238.8	177.1	136.2	107.7	86.2
		3	Wind	553.1	346.5	241.4	177.6	135.2	105.1	83.2
0.6	0.6	1	Wind	547.5	334.2	224.0	157.7	114.8	85.7	65.3
		2	Wind	552.6	345.9	241.9	180.1	139.3	110.2	89.3
		3	Wind	555.6	349.5	244.9	181.1	138.3	108.2	86.2
0.7	0.5	1	Wind	546.5	332.7	222.5	156.1	113.3	84.2	63.8
		2	Wind	551.6	344.9	240.8	179.1	138.3	109.7	88.3
		3	Wind	554.6	348.5	243.4	180.1	137.3	107.2	85.2
0.8	0.5	1	Wind	548.0	335.2	225.0	158.7	115.8	86.2	65.8
		2	Wind	552.6	346.5	242.4	180.6	139.8	110.7	89.8
		3	Wind	555.1	349.5	245.4	181.7	139.3	109.2	86.8

For Imperial Units: 1 mm= 0.0394 inch; 1 m= 3.05 feet; 1 kgf/m²= 0.205 psf

Table 4-Allowable Positive and Negative Uniform Load for 100mm Thick Exterior Wall Panels (kgf/m²)

Panel Skin Thickness (mm)		Number of Span	Load Type	Panel Support Spacing (m)						
Facer	Liner			1	1.5	2	2.5	3	3.5	4
0.5	0.5	1	Wind	742.4	456.7	309.2	219.9	161.2	120.9	92.9
		2	Wind	748.0	469.9	330.1	247.0	191.9	152.6	124.0
		3	Wind	751.0	474.5	334.2	248.5	191.4	150.5	120.4
0.6	0.5	1	Wind	745.4	461.2	314.8	225.5	166.4	126.0	97.0
		2	Wind	750.5	473.5	333.7	250.0	194.9	156.1	127.1
		3	Wind	753.1	477.6	337.3	252.6	195.4	154.6	124.0
0.6	0.6	1	Wind	749.0	466.4	320.4	231.1	172.0	131.1	101.6
		2	Wind	753.1	476.6	337.3	253.6	198.5	159.2	130.6
		3	Wind	755.6	480.6	341.4	256.1	199.5	158.7	128.1
0.7	0.5	1	Wind	748.0	464.8	318.4	229.6	170.4	129.6	100.0
		2	Wind	752.1	475.5	336.2	252.6	197.5	158.2	129.1
		3	Wind	754.6	479.6	339.8	255.1	198.0	157.2	127.1
0.8	0.5	1	Wind	749.5	467.4	321.5	232.7	173.5	132.2	102.6
		2	Wind	753.1	477.1	337.8	254.6	199.0	160.2	131.1
		3	Wind	755.6	481.1	341.9	257.2	200.0	159.2	129.1

For Imperial Units: 1 mm= 0.0394 inch; 1 m= 3.05 feet; 1 kgf/m²= 0.205 psf

Notes for Tables 2-4:

1. The tabulated load values apply to panel types listed in [Table 1](#) of this report for external wall cladding applications. Panels must be installed in accordance with Section 4.2.1 of this report.
2. The tabulated values are based on engineering analysis validated by uniform transverse load testing and applying a safety factor of 2.0.
3. Connection of panel to supporting member must be designed by registered design professional and is outside scope of this report.
4. The tabulated values consider a deflection limit of L/120 in accordance with IBC Section 1604.3.
5. The number of spans are based on panels having equal spans and uniformly loaded.

TABLE 5-ALLOWABLE UNIFORM LOAD OF INTERIOR PARTITION PANEL1,2,3,4,5

Maximum Panel Span (m)	Allowable Uniform Partition Load (kgf/m ²)
3.5	24.4

For Imperial Units: 1 m= 3.05 feet; 1 kgf/m²= 0.205 psf

¹The tabulated values apply to the panel types listed in Table 1 of this report for interior wall partition applications.

²Panels must be installed in accordance with Section 4.2.2 of this report.

³The tabulated values are based on uniform transverse load testing and applying a safety factor of 3.0.

⁴The tabulated values consider a deflection limit of L/120 in accordance with IBC Section 1604.3.

⁵The tabulated values are based on 50mm thick interior partition panel with both 0.5mm skin thickness.

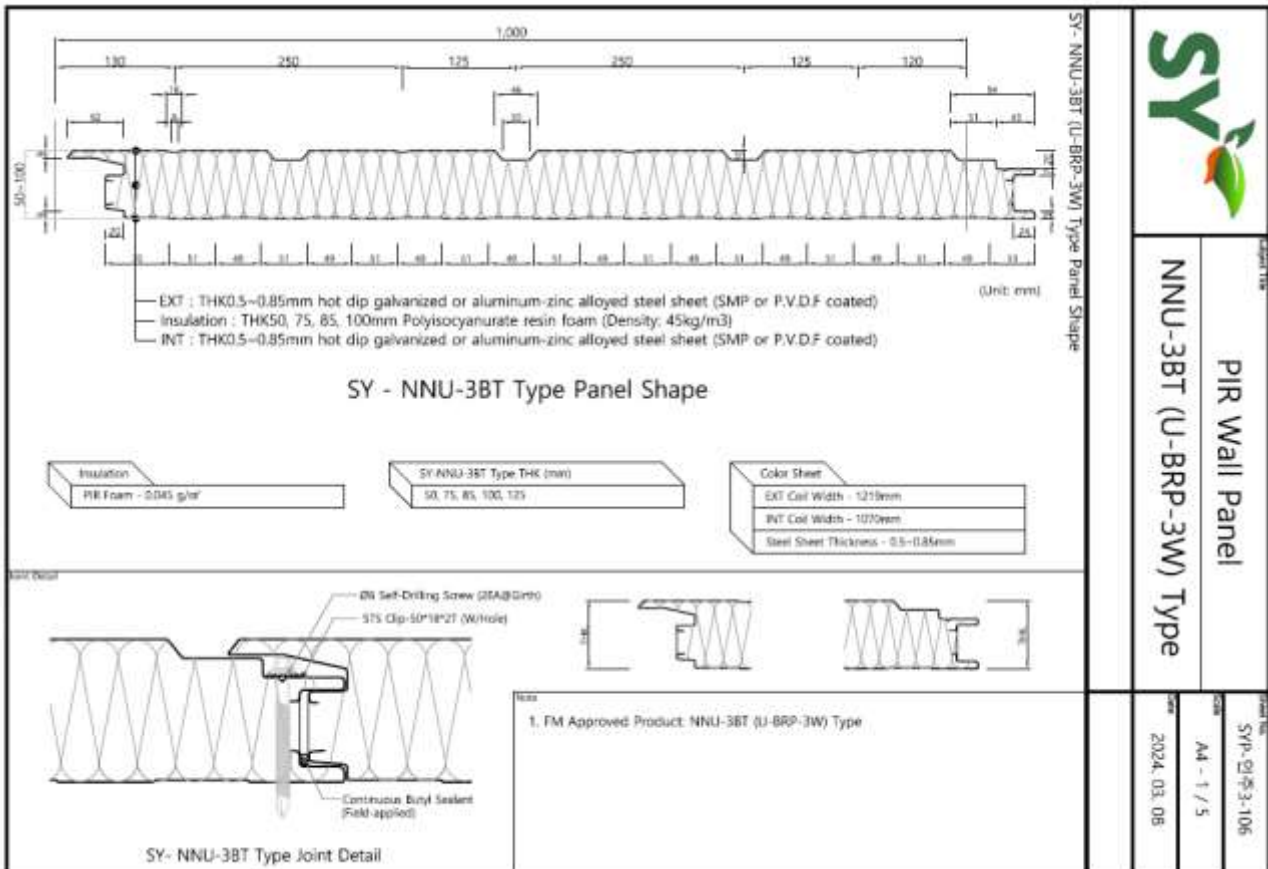
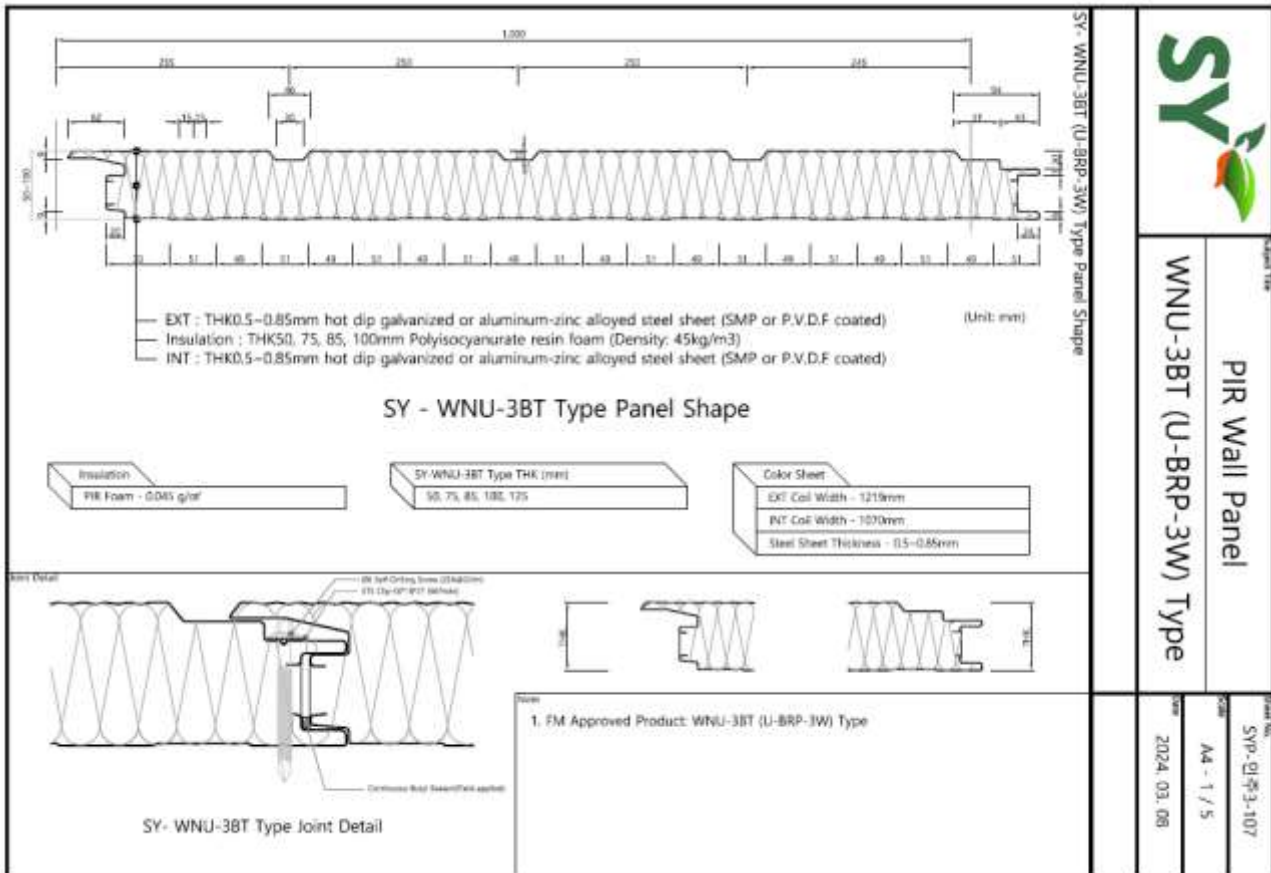


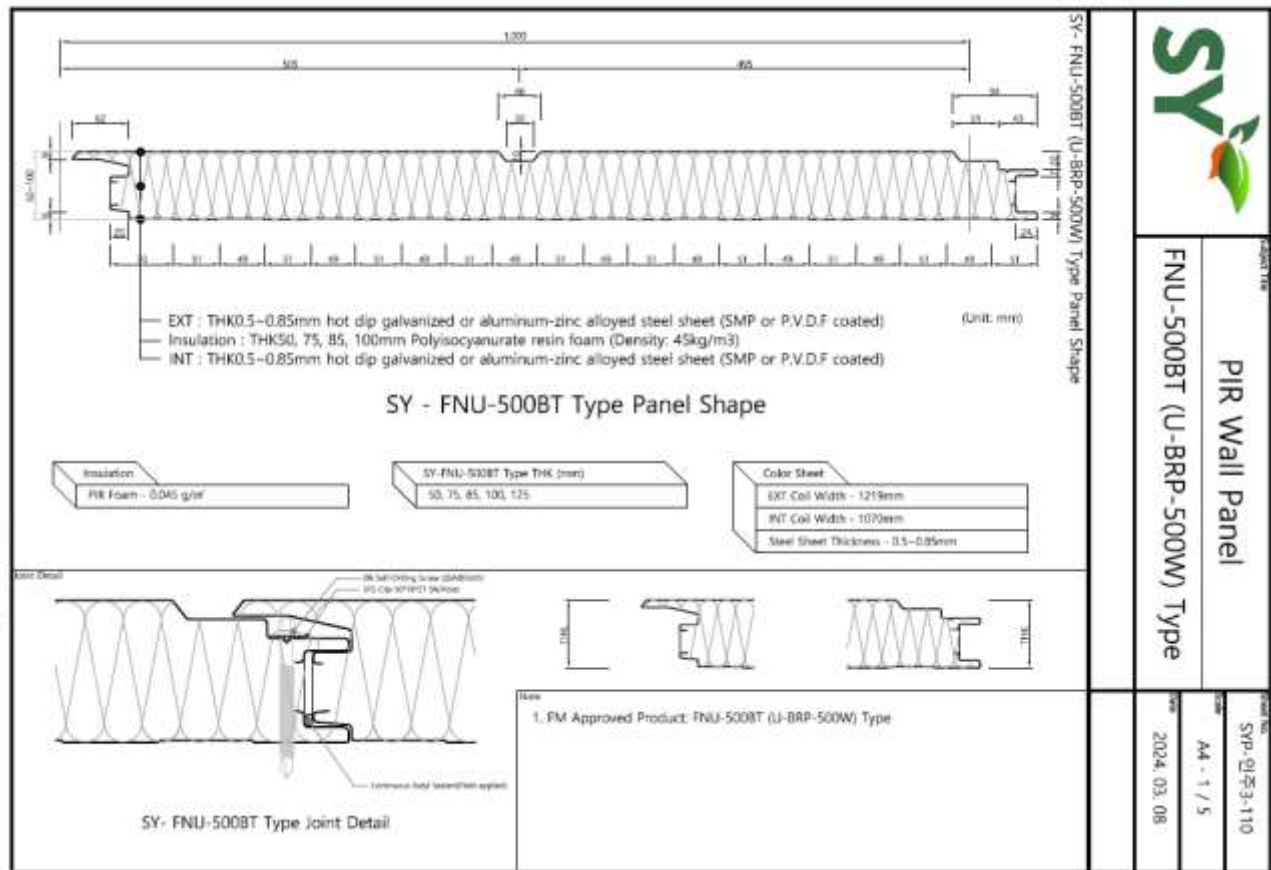
FIGURE 1—NNU-3BT



PIR Wall Panel
 WNU-3BT (U-BRP-3W) Type

SY-P-QR-3-107
 A4 - 1 / 5
 2024. 03. 08

FIGURE 2—WNU-3BT



PIR Wall Panel
 FNU-500BT (U-BRP-500W) Type

SY-P-QR-3-110
 A4 - 1 / 5
 2024. 03. 08

FIGURE 3—FNU-500BT

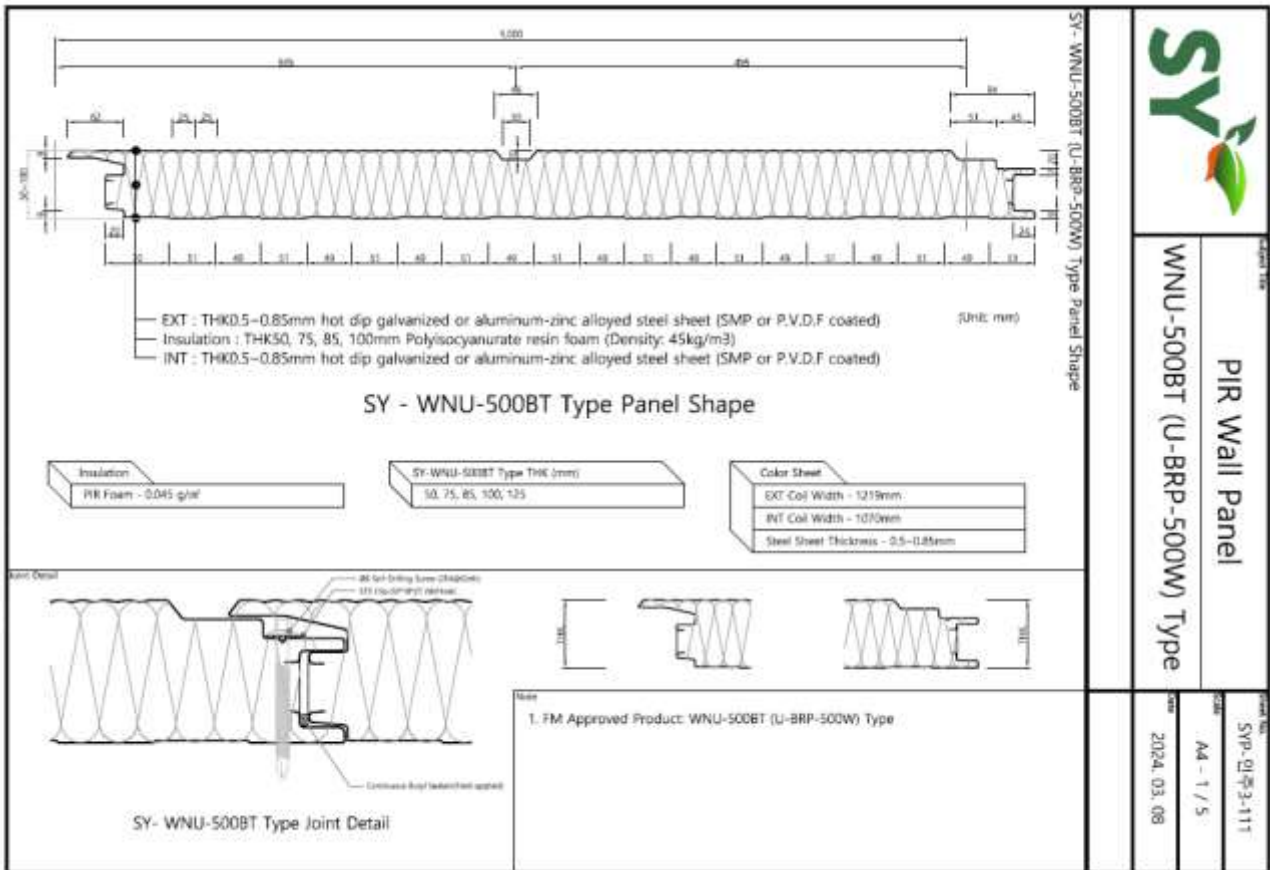


FIGURE 4—WNU-500BT

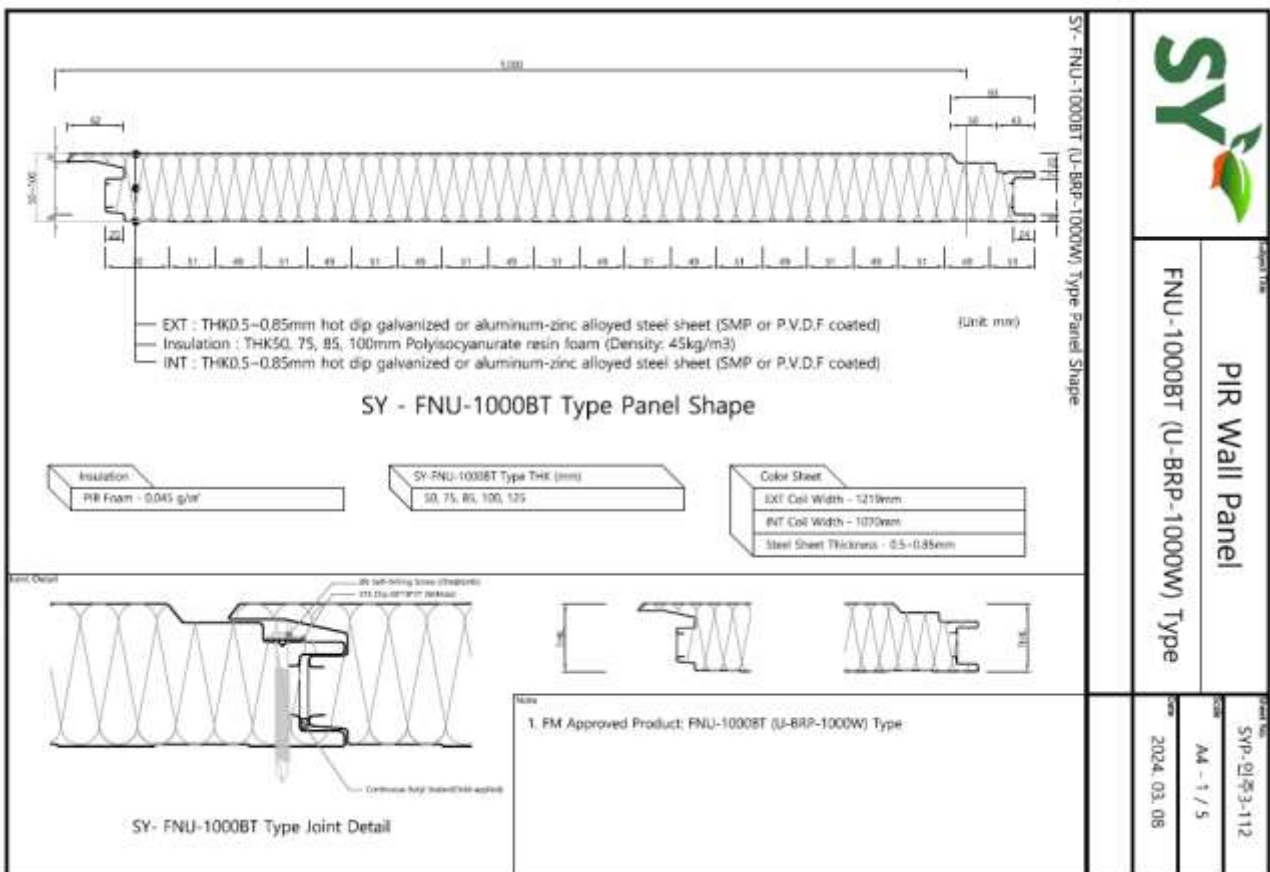


FIGURE 5—FNU-1000BT

PIR Wall Panel WNU-500BT (U-BRP-500W) Type	
SYP-01-3-11T	AA - 1 / 5
2024.03.08	2024.03.08

PIR Wall Panel FNU-1000BT (U-BRP-1000W) Type	
SYP-01-3-11T	AA - 1 / 5
2024.03.08	2024.03.08

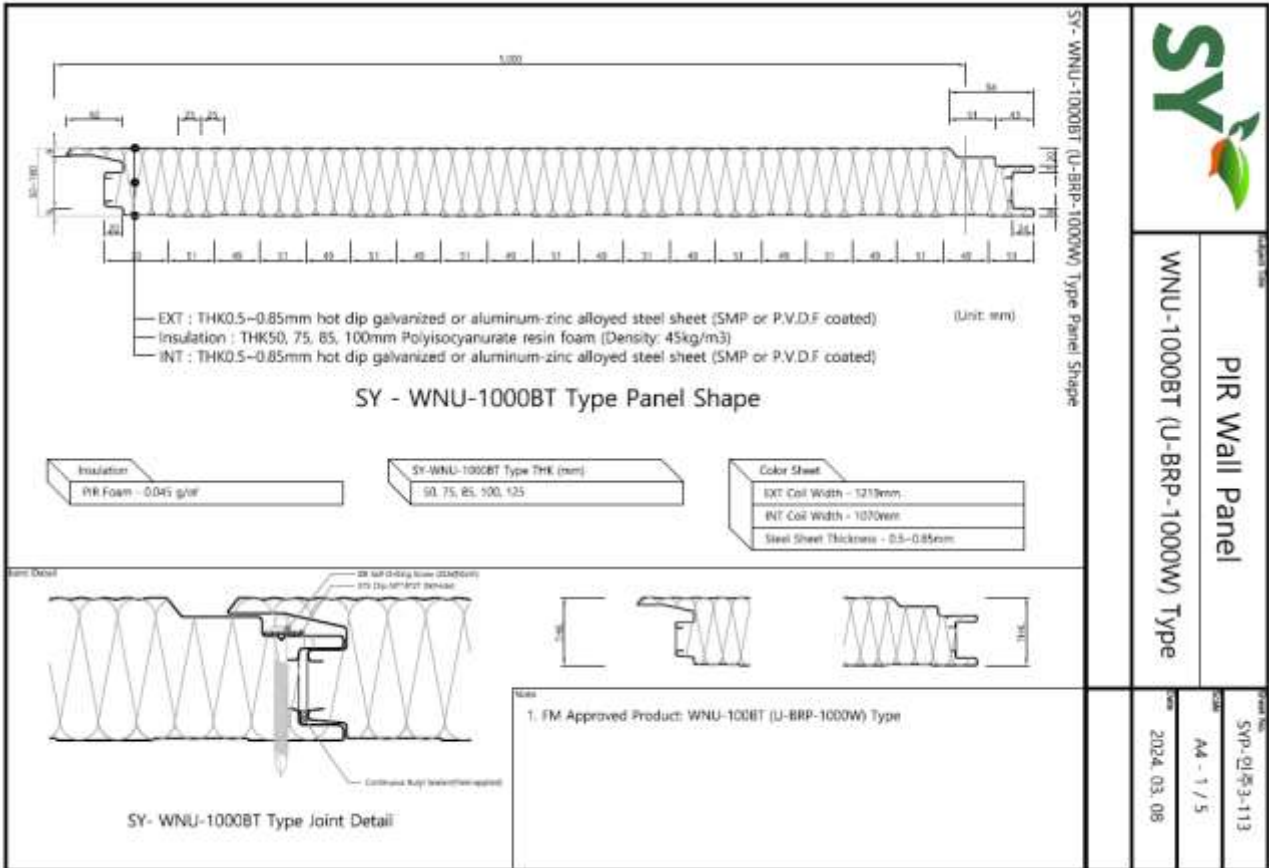


FIGURE 6—WNU-1000BT

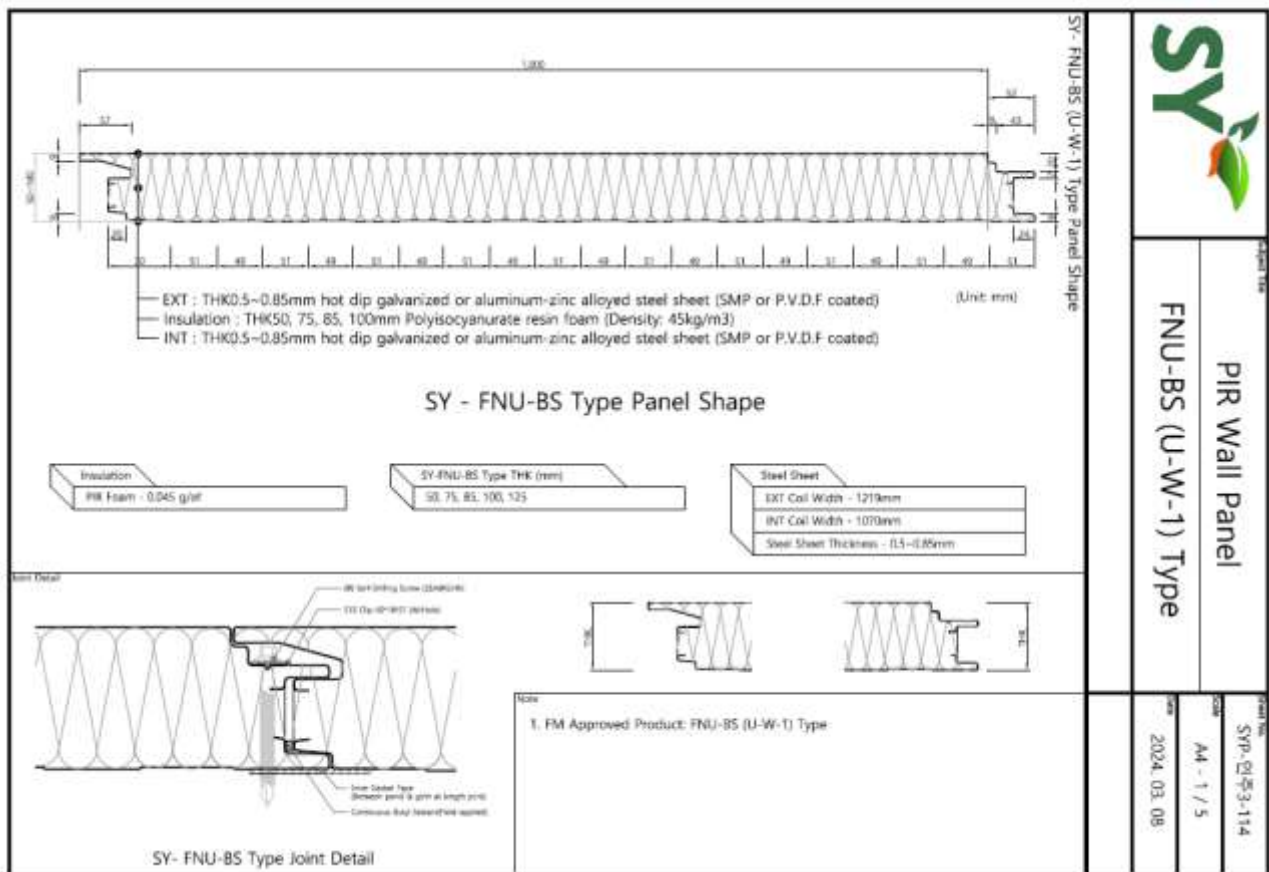


FIGURE 7—FNU-BS

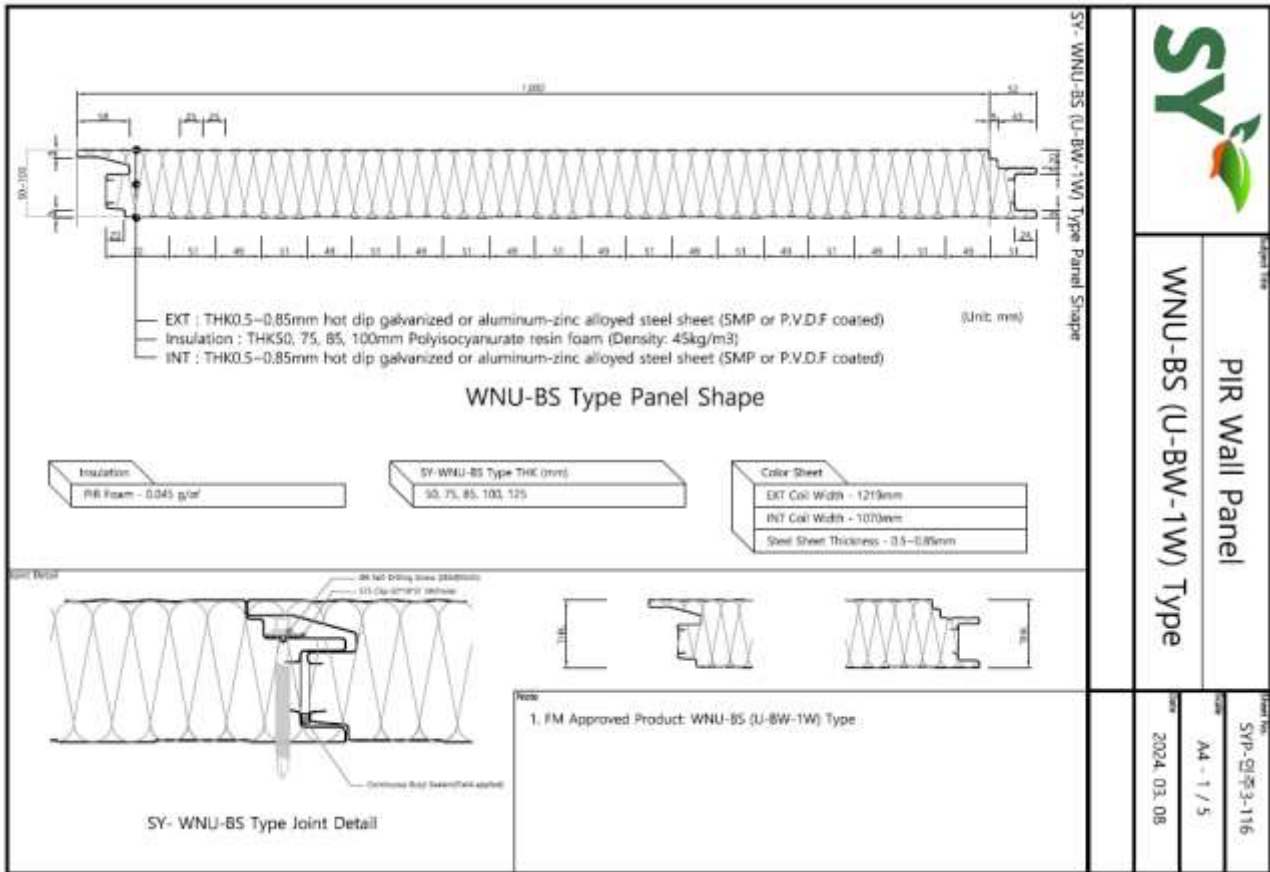


FIGURE 8—WNU-BS

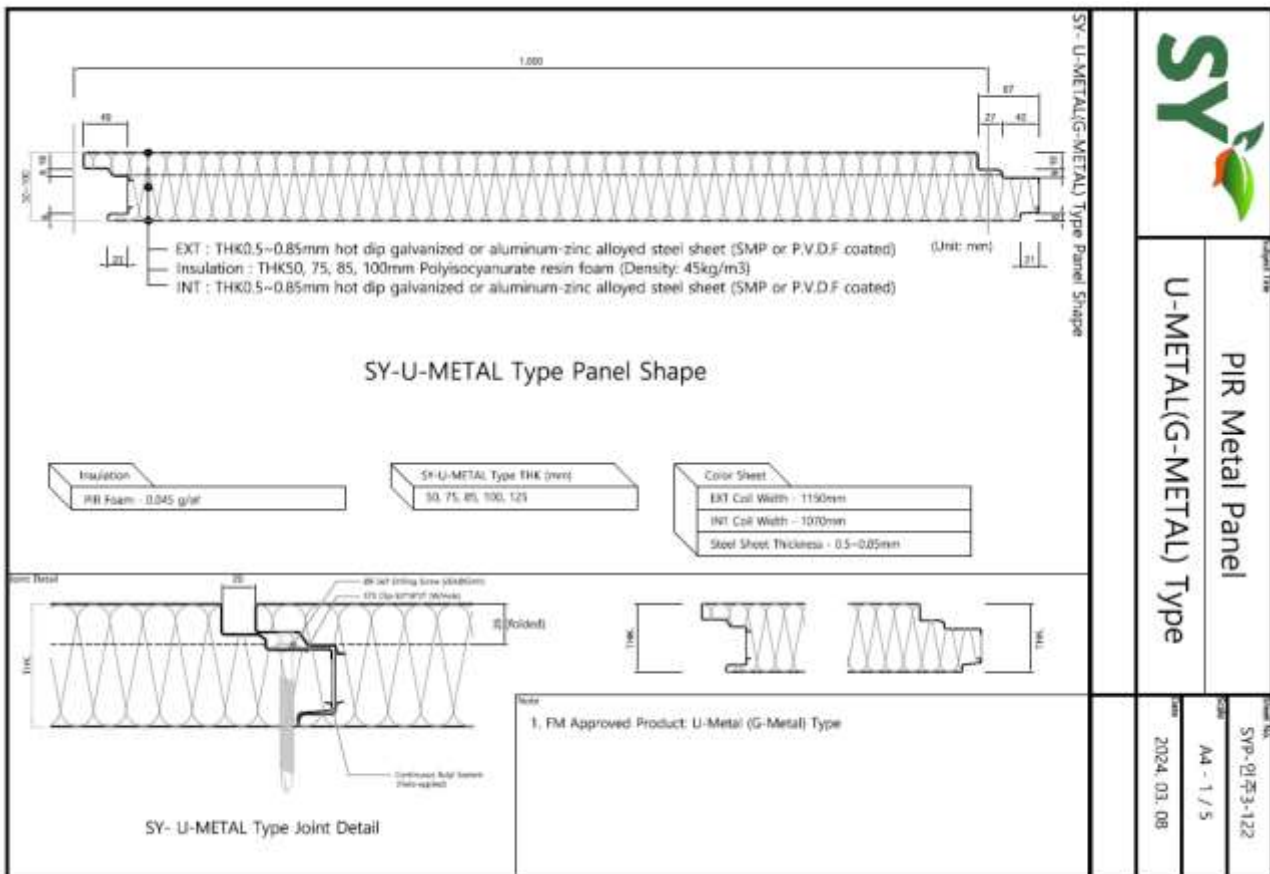


FIGURE 9—U-METAL

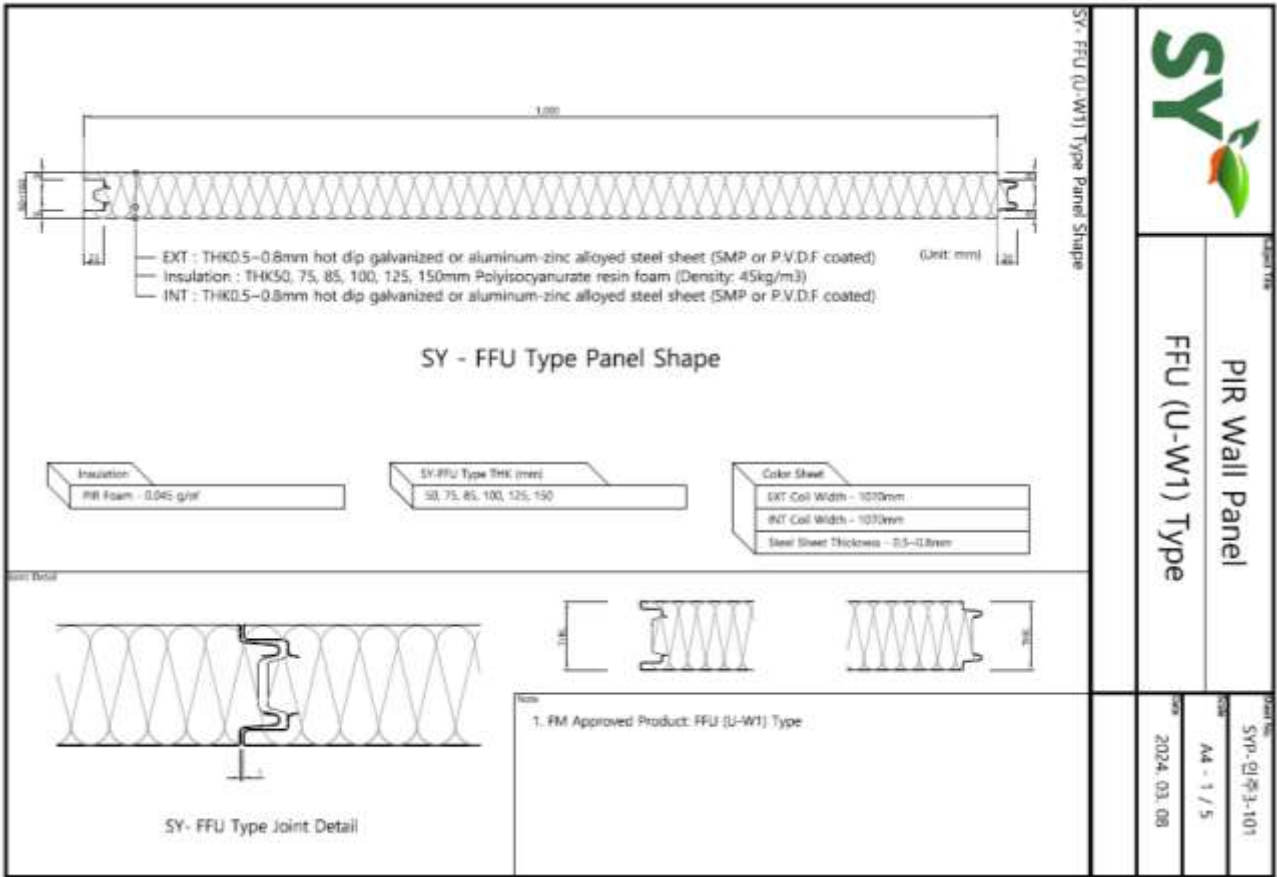


FIGURE 10—FFU

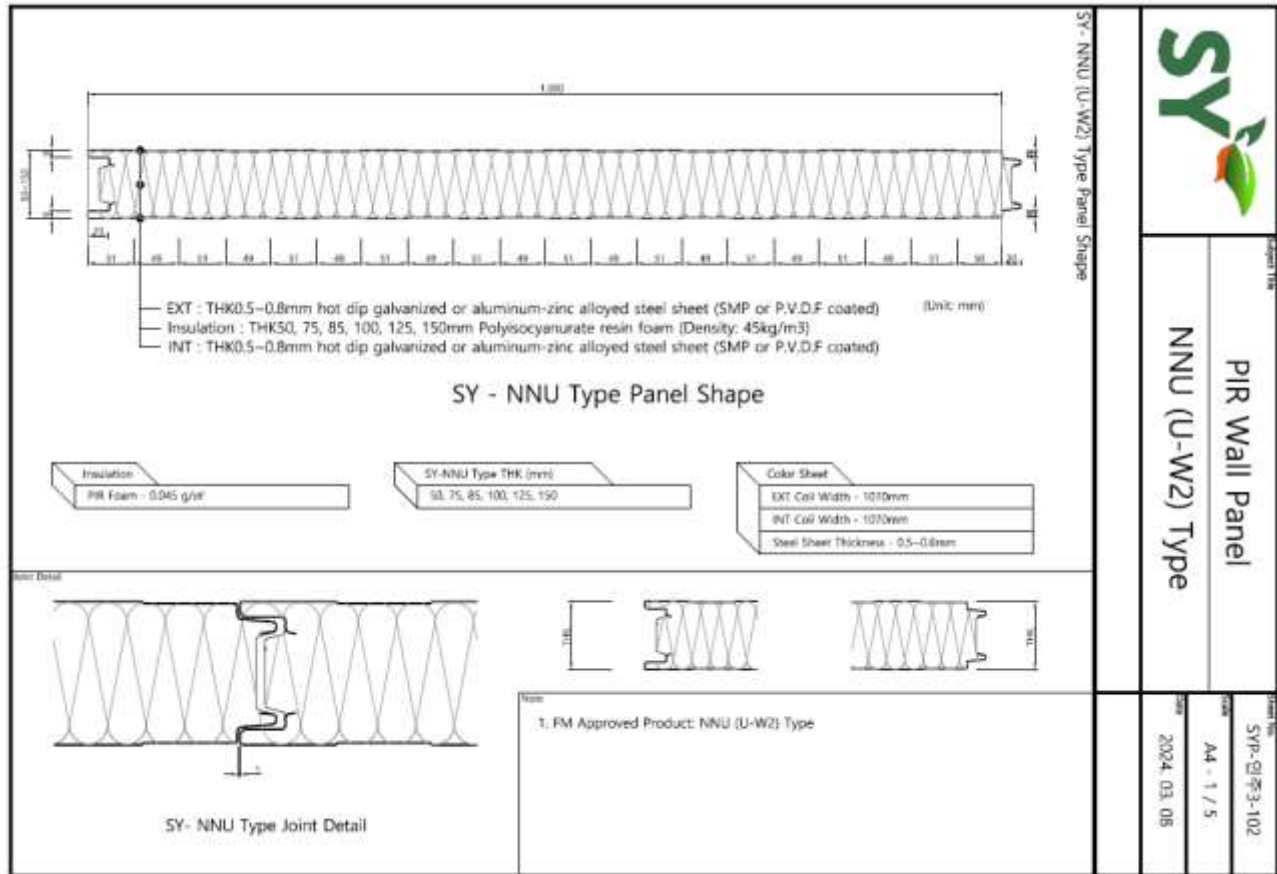


FIGURE 11—NNU

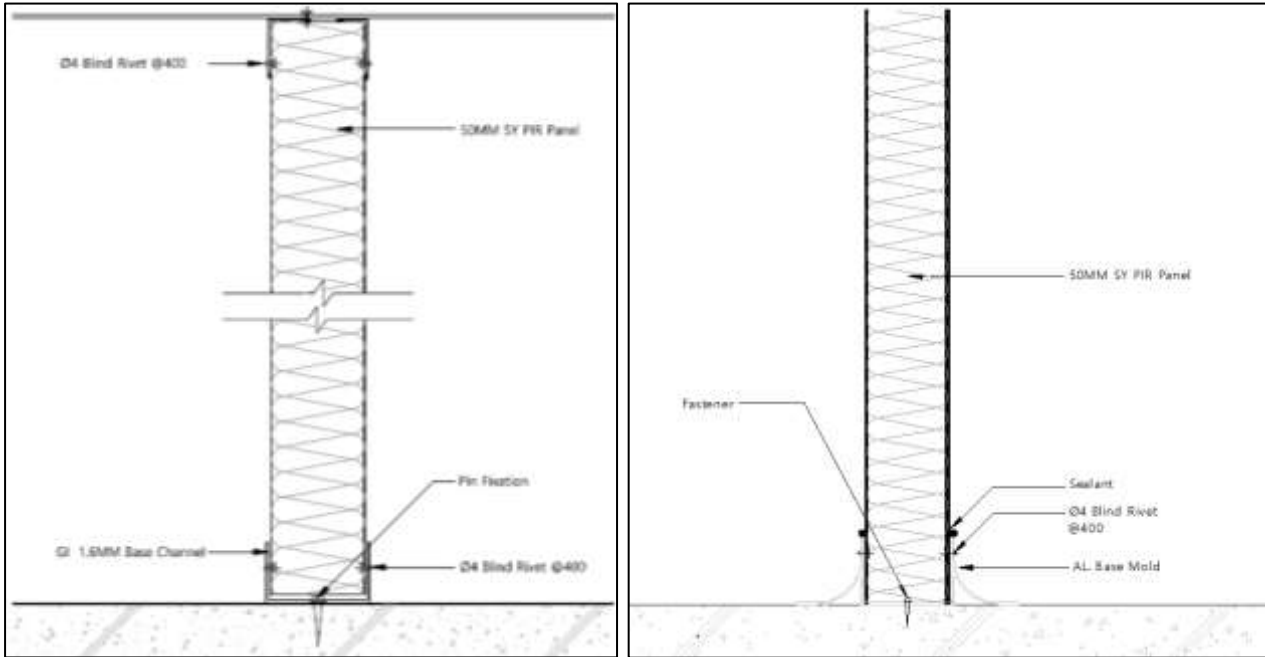


FIGURE 12—TYPICAL INSTALLATION OF INTERIOR WALL PARTITION

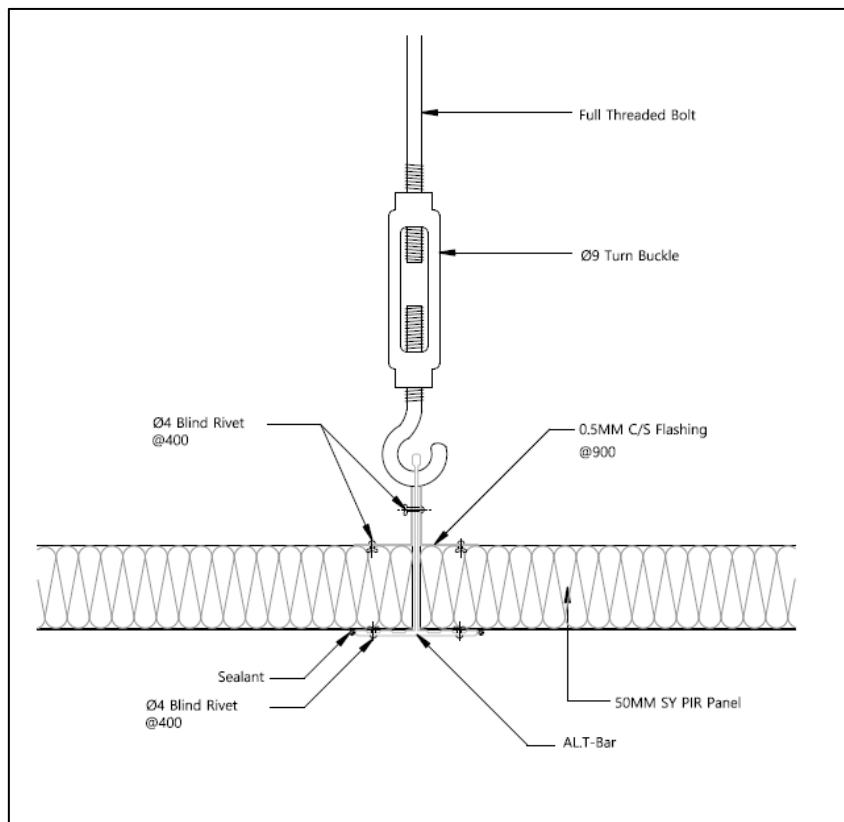


FIGURE 13—TYPICAL INSTALLATION OF CEILING PANEL

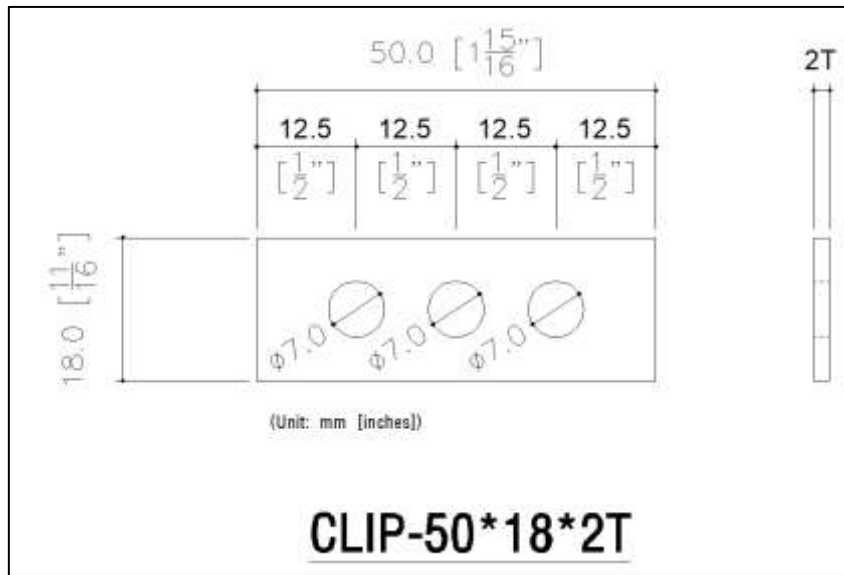


FIGURE 14—STS CLIP